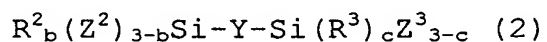
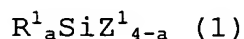


## CLAIMS

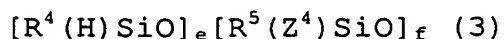
1. A composition for forming porous film obtainable by hydrolysis and condensation, in an acidic or alkaline condition, of a mixture of

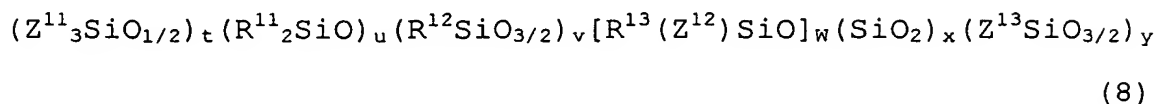
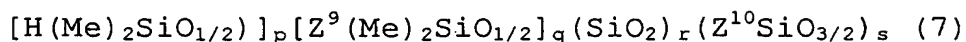
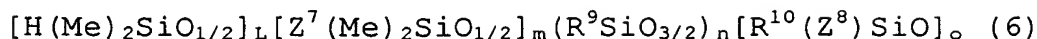
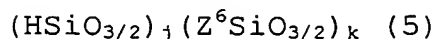
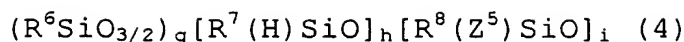
100 parts by weight of one or more compounds selected of the group consisting of hydrolysable silicon compounds represented by Formulas (1) and (2) and partially hydrolyzed and condensed products of the hydrolysable silicon compounds represented by Formulas (1) and (2):



wherein  $R^1$ ,  $R^2$  and  $R^3$  each independently represents a monovalent hydrocarbon group which may be substituted or non-substituted;  $Z^1$ ,  $Z^2$  and  $Z^3$  each independently represents a hydrolysable group; Y is independently selected from the group consisting of an oxygen atom, a phenylene group and an alkylene group having carbon atom number of 1 to 6; a independently represents an integer of 0 to 3; b and c each independently represents an integer of 0 to 2;

and 0.1 to 20 parts by weight of one or more cross-linking agents selected from the group consisting of structure-controlled cyclic or multi-branched oligomers represented by Formulas (3) to (8):





wherein Me represents a methyl group;  $R^4$  to  $R^{13}$  each independently represents a monovalent hydrocarbon group which may be substituted or non-substituted;  $Z^4$  to  $Z^{13}$  each independently represents a hydrolysable group; e, f, g, h, i, j and k each independently represents an integer of 0 to 10 with proviso that  $e+f \geq 3$ ,  $g+h+i \geq 4$  and  $j+k \geq 4$ ; L, m, n, o, p, q, r, s, t, u, v, w, x and y each represents an integer of 0 to 20 with proviso that  $L+m+n+o \geq 4$ ,  $p+q+r+s \geq 4$  and  $t+u+v+w+x+y \geq 3$ .

2. The composition for forming film according to Claim 1 further comprising a solvent.

3. A method for forming porous film comprising a step of coating a substrate with said composition of Claim 1 or 2 to form film and a step of forming pores in the film.

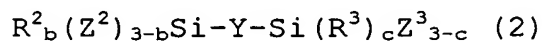
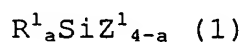
4. The method for forming porous film according to Claim 3 wherein said step of forming pores comprise a first heating treatment at temperature high enough to evaporate the solvent in said film and a second heating treatment.

5. A porous film obtainable from said composition of Claim 1 or 2.

6. An interlevel insulator film formable by said composition of Claim 1 or 2.

7. A semiconductor device comprising internal porous film which is formable by a composition for forming porous film obtainable by hydrolysis and condensation, in an acidic or alkaline condition, of a mixture of

100 parts by weight of one or more compounds selected of the group consisting of hydrolysable silicon compounds represented by Formulas (1) and (2) and partially hydrolyzed and condensed products of the hydrolysable silicon compounds represented by Formulas (1) and (2):



wherein  $R^1$ ,  $R^2$  and  $R^3$  each independently represents a monovalent hydrocarbon group which may be substituted or non-substituted;  $Z^1$ ,  $Z^2$  and  $Z^3$  each independently represents a hydrolysable group; Y is independently selected from the group consisting of an oxygen atom, a phenylene group and an alkylene group having carbon atom number of 1 to 6; a independently represents an integer of 0 to 3; b and c each independently represents an integer of 0 to 2;

and 0.1 to 20 parts by weight of one or more cross-linking agents selected from the group consisting of structure-controlled cyclic or multi-branched oligomers represented by Formulas (3) to (8):

$$[R^4(H)SiO]_e[R^5(Z^4)SiO]_f \quad (3)$$

$$(R^6SiO_{3/2})_g[R^7(H)SiO]_h[R^8(Z^5)SiO]_i \quad (4)$$

$$(HSiO_{3/2})_j(Z^6SiO_{3/2})_k \quad (5)$$

$$[H(Me)_2SiO_{1/2}]_L[Z^7(Me)_2SiO_{1/2}]_m(R^9SiO_{3/2})_n[R^{10}(Z^8)SiO]_o \quad (6)$$

$$[H(Me)_2SiO_{1/2}]_p[Z^9(Me)_2SiO_{1/2}]_q(SiO_2)_r(Z^{10}SiO_{3/2})_s \quad (7)$$

$$(Z^{11}_3SiO_{1/2})_t(R^{11}_2SiO)_u(R^{12}SiO_{3/2})_v[R^{13}(Z^{12})SiO]_w(SiO_2)_x(Z^{13}SiO_{3/2})_y \quad (8)$$

wherein Me represents a methyl group;  $R^4$  to  $R^{13}$  each independently represents a monovalent hydrocarbon group which may be substituted or non-substituted;  $Z^4$  to  $Z^{13}$  each independently represents a hydrolysable group; e, f, g, h, i, j and k each independently represents an integer of 0 to 10 with proviso that  $e+f \geq 3$ ,  $g+h+i \geq 4$  and  $j+k \geq 4$ ; L, m, n, o, p, q, r, s, t, u, v, w, x and y each represents an integer of 0 to 20 with proviso that  $L+m+n+o \geq 4$ ,  $p+q+r+s \geq 4$  and  $t+u+v+w+x+y \geq 3$ .

8. The semiconductor device according to Claim 7 wherein said porous film is between metal interconnections in a same layer of multi-level interconnections, or is between upper and lower metal interconnection layers.